HW #1 Big O + Unit Testing

1) list x concat w/ list y:

a = len(x) + len(y) → new list size O(1) + O(1)

z = new list of length a O(1)

copy x to z O(n)

copy y to z O(n)

n = a * depends on total elements

$O(n) + O(n) + 3 \cdot O(1) = \boxed{O(n)}$

1. Initialize a new list w/ combined length of lists x + y
2. Copy over the first list, then second list to new list

2)

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max = 1, count = 1, index = 0        # counter variables   | O(1)  assign
for i in range(len(list) - 1)                              | O(n)  loop on len(list)
    if (list[i] > list[i]):          # check if next is higher | O(1)  compare
        count + 1                    # current count       | O(1)  add
        if (count > max):            # if current > max    | O(1)  compare
            max = count                                    | O(1)  assign
            index = (i+2) - max      # index based on max and list location | O(1)  assign, add, subtract
    else:
        count = 1                    # reset count         | O(1)  assign
return list[index : index + max]     # get new list        | O(1)  assign
```

$20(1) + 70(n) \leq 80(n) \Rightarrow \boxed{O(n)}$ where n is length of list

$n_0 = 4$